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Violence, HIV risk behavior and depression among female sex workers of Eastern Nepal.

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TITLE

Violence, HIV risk behavior and depression among female sex workers of Eastern Nepal.

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among female sex workers of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of female sex workers.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.

- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

ABSTRACT

- Introduction

There is dearth of knowledge regarding mental health of female sex workers (FSWs) of Nepal. The sex trade affects a person physically, psychologically and sexually making them vulnerable to mental disorders including depression.

- Objectives: The primary objective of the study was to estimate the prevalence of depression among female sex workers of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.
- Design: Cross sectional study.
- Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based female sex workers were recruited in the study.
- Participants: Females who had been involved in commercial sex activity in the past six months were included.
- Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered to be depression.

- Methodology: A total of two hundred and ten female sex workers were sought through "snowball" sampling technique. Face to face interview was done with each participant where data regarding their depression status, HIV high risk behavior and violence were recorded.
- Results:

In our study, 81.35% of respondents fall in the high depressive category. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence (95% CI 2.223-15.635). Similarly, the respondents who were involved in any HIV high risk behavior were six times more likely to be depressed than those who were not (95% CI 2.099-17.369).

- Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among female sex workers of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect in HIV prevention efforts which will help to promote overall health of this population.

INTRODUCTION

Female sex workers (FSWs) represent a marginalized population that faces many occupational hazards. They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and consequent stigmatization. Vulnerability of sex workers to HIV/AIDS varies by country and is multidimensional. The first dimension relates to the legislative structure in which they operate. In Nepal, there are no clear rules and regulations regarding legality of prostitution. Thus, where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[1] The second dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[2-4] The last dimension relates to the poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom".[5]

Due to the world wide concern regarding spread of human immunodeficiency virus / acquired immune deficiency syndrome (HIV/AIDS) through this group, public health is more concerned with the health of customers of sex workers with preventive measures almost exclusively

focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or in particular on the mental health consequences of sex work.[6]

As a result, the mental health needs of this stigmatized population is generally been ignored. The vast majority of research related to sex workers addresses the physical health and safety of sex workers, but does not discuss their psychosocial needs as exemplified by the lack of research specific to the area of mental health and counseling services for sex workers. Thus, we designed a study to assess the present depressive symptoms of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade.

We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior and support behavior change, and even improve health outcomes.

MATERIAL AND METHODS

A descriptive study was conducted in three districts of Eastern Nepal. The female sex workers who had been involved in commercial sex activity in the past six months were included in the study. A total of 210 FSWs were included in the study and this size was chosen on the basis of Puerto Rican study which revealed prevalence of depression among sex workers to be 70%.[12]

By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L2$$

$$= (1.96*1.96 *70*30) / 7*7$$

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district. The sex workers were contacted through Snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area.

Depressive symptomatology was recorded using Centre for Epidemiological Studies: Depression scale (CES-D) which is 20 item scale in which a cut-off point of 16 is considered appropriate to differentiate respondents with depression.[8-9]

Questions regarding HIV risk behavior was adapted from Family Health International - HIV/AIDS/STD Behavioral Surveillance Surveys: for use with female sex workers.[10] Positive history of a) syringe exchange; b) sex with intravenous drug user; c)sex under the influence of alcohol or drugs; d) oral sex; e) anal sex; f)Non-usage of condoms during every sexual encounter; g) pregnancy after joining the sex trade was considered as being involved in HIV high risk behavior.

Questions regarding work related violence adapted from questionnaire developed during WHO multi-country study on women's health and domestic violence Against women. [11] The questionnaire consists of 4 questions of psychological violence and two each for physical and sexual violence. A positive response to any one of the questions was regarded as suffering from violence in the workplace. The questions were originally prepared in English and later translated into Nepali for collection of data according to standard translation guidelines.

Completed questionnaires without any missing data were only included in the study as repeating of interviews would have been difficult due to high mobility of the study population.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0. Odds Ratios were calculated to assess association of depression with variables of HIV high risk behavior and violence. Finally, Binary Logistic regression analysis with backward elimination was used to identify significant predictors of depression among the associated independent variables.

Ethical approval was taken from the institutional ethical review board. Informed consent was taken from each respondent. Confidentiality and anonymity was assured and maintained.

RESULTS:

The prevalence of depression in our study was 81.4% as shown in table 1. Table 2 shows that a high rate of depression was seen in respondents who suffered from psychological violence. Additionally, more than 90 per cent of the respondents, who had been insulted, humiliated in front of others and intimidated on purpose were depressed. The proportion of depressed FSWs did not differ significantly among women who had experienced physical and sexual violence. Consequently, female sex workers who had been insulted had three times higher chances of suffering from depressive symptoms. The respondents who were humiliated in front of others and intimidated were twice likely to be having depression. The risk of depression was about seven times higher among the female sex workers who gave a positive history of suffering from any form of violence.

Table 3 shows that the distribution of proportion for individual HIV high risk behaviors was not hugely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). Consequently, the risk of depression was three times higher in female sex workers who had been involved in any one of the mentioned high risk behavior.

Logistic regression analyses with the variables which showed significant association with depression revealed women who had experienced any form of violence had five times higher chance of being in depressive category than respondents who had not experienced any form of violence (95% CI 2.22, 15.63) as shown in table 4. Similarly, sex workers who were involved in at least one mentioned HIV risk behavior were 6 times higher risk to be in higher depressive category (95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significant predictors of depression.

DISCUSSION:

In our study, the prevalence of depression among female sex workers was 81.40 per cent. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the participants had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[12] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill

themselves.[13] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio cultural characteristics. Comparable findings were seen in another study done by Algeria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[6] A Nigerian study concluded that in comparison with women of other occupational groups the female sex workers are psychopathological. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[7]

In accordance with the popular belief, the women experiencing violence were more likely to be depressed than those who had not experienced violence (AOR 5.896, CI 2.223-15.635). Similar conclusion was made by a study from India which aimed to assess the mental health status of 57 female sex workers. Those respondents who experienced higher violence at work and at home had a higher measure of depression (Chi square value = 7.27 with $\alpha \leq .01$).[13] Harris M et al did a qualitative study to address the experiences of female sex workers in urban Australia. They have been diagnosed with bi-polar disorder, and been mentally abused by a former partner. [14] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among female sex workers (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts (AOR 2.15 95% CI 1.05, 4.38) for suicidal thoughts and 2.94 (95% CI 1.27, 6.78) for suicide attempts, respectively. [15]

In the current study, female sex workers being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.099, 17.369). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms (OR 4.92, 95% CI 1.49, 16.26). Injected drug users were about seven times more likely than those who did not inject drugs to reach high levels of depressive symptoms (OR = 7.57, 95% CI 2.56 22.36).[7] Heidi E. and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[16] In a study done in Australia, Logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [17]

Our study concludes that there is a high prevalence of depression among the female sex workers of Eastern Nepal and HIV risk behavior along with violence are significant predictors of violence. However, due to the cross sectional design of the study we cannot infer that whether the sex workers became depressed after joining the sex trade or before. Although, we tried to include female sex workers of major cities of Eastern Nepal where prostitution is rampant, there are certain limitations of our study, the hidden group, women working during few

months, mobile female sex workers might have been missed. The external validity of the study is questionable due to the hidden nature of the sampling frame.

This study suggests that HIV risk behavior and violence are possible risk factors for depression among female sex workers. HIV prevention strategies need to be designed to address the distress and poor mental health prevalent in this profession. FSWs are scared of the law and thus, are less hesitant to practice their rights to say "NO" to their clients. There is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and think about ways to address the issues of this population.

ACKNOWLEDGEMENTS

We would like to express our gratitude towards the respondents who gave us their valuable time for completion of this study. We are also grateful to the team of NGO-Sahara Nepal who helped us to locate the respondents and thus, facilitated data collection.

Funding: No funding was available.

TABLES

Table 1 : Depression among female sex workers of Eastern Nepal.

Depression (CES-D) score	n = 210	Percentage(%)
Yes (≥ 16)	173	81.4
No (< 16)	37	18.6

Table 2 : Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI
	Absent (%)	Present (%)		
Insulted or made to feel bad				
Yes	9.6	90.4	3.28	1.50, 7.20
No	17.4	72.6		
Humiliated in front of others				
Yes	9.7	90.3	2.46	1.06, 5.70
No	23.9	76.1		
Intimidated on purpose				
Yes	9.4	90.6	2.25	0.82, 6.12
No	20.4	79.6		
Threatened to hurt loved ones				
Yes	17.9	82.1	0.98	0.34, 2.77
No	17.6	82.4		
Pushed or shoved				
Yes	81.4	78.6	0.75	0.28, 2.01
No	17.0	83.0		
History of physical assault				
Yes	15.2	84.8	1.23	0.44, 3.44

No	18.1	81.9		
Raped or sexually assaulted				
Yes	20.0	80.0	0.84	0.26, 2.67
No	17.4	82.6		
Attempt to rape				
Yes	17.6	82.4	0.99	0.43, 2.28
No	17.6	82.4		
Suffered from any form of violence				
Yes	10.3	89.7	6.96	3.21, 15.08
No	44.4	55.6		

Table 3: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% Confidence Interval
	Absent (%)	Present (%)		
Sexual intercourse under influence				
Yes	14.6	85.4	1.48	0.71, 3.06
No	20.2	79.8		
Sex with a intravenous drug user				
Yes	14.3	85.7	1.31	0.36, 4.72

No	18.0	82.0		
History of anal sex				
Yes	14.8	85.2	0.12	0.05, 0.31
No	12.9	87.1		
History of oral sex				
Yes	34.8	65.2	0.34	0.13, 0.88
No	15.5	84.5		
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67
Yes	16.6	83.4		
No				
History of pregnancy after joining the sex trade				
Yes	12.4	87.6	1.94	0.90, 4.17
No	21.5	78.5		
Presence of any one HIV risk behavior				
Yes	14.0	86.0	3.20	1.44, 7.11
No	34.2	65.8		

Table 4: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Predictors	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

Competing Interests: none declared.

Funding: No funds were available.

Contributorship: Rsagtani was involved in conception and designing the study along with data collection and writing drafts.

S Bhattarai was involved in concept refining,developing questionnaire, writing drafts and critiquing them.

B adhikari helped in translation of questionnaire, diagnosis of depression, inputs in writing drafts.

DD Baral was instrumental in designing the study,statistical analysis and drafting the results.

DK Yadav was involved in critical analysis of the earlier drafts.

PKPokharel was responsible for concept refinement and critical analysis of the earlier drafts.

All the authors have read and approved the final version of the article for scientific publication.

Data sharing: No additional data is available.

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STROBE STATEMEMENT

Item No	Recommendation	Main Document (page no.)
Title and abstract [1]	(a) Indicate the study's design with a commonly used term in the title or the abstract.	1
	(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction		
Background [2]	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives [3]	State specific objectives, including any pre specified hypotheses	4
Methods		
Study design [4]	Present key elements of study design early in the paper	4-5
Setting [5]	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	-
Participants [6]	Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables [7]	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	-
Data sources/ measurement [8]	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias [9]	Describe any efforts to address potential sources of bias	-
Study size [10]	Explain how the study size was arrived at	4-5
Quantitative variables [11]	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	-
Statistical methods [12]	(*a*) Describe all statistical methods, including those used to control for confounding	6
	(*b*) Describe any methods used to examine subgroups and interactions	-
	(*c*) Explain how missing data were addressed	6
	(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
	(*e*) Describe any sensitivity analyses	-
Results Participants [13]	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
	(b) Give reasons for non-participation at each stage	-
	(c) Consider use of a flow diagram	-
Descriptive data [14]	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
	(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data [15]	Report numbers of outcome events or summary measures	6
Main results [16]	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
	(*b*) Report category boundaries when continuous variables were categorized	-
	(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses [17]	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion		
Key results [18]	Summarise key results with reference to study objectives	7-8
Limitations [19]	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9

Interpretation [20]	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability [21]	Discuss the generalisability (external validity) of the study results	10
Other information		
Funding [22]	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10

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ABSTRACT

- Introduction

There is dearth of knowledge regarding mental health of FSWs (FSWs) of Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

- Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.
- Design: Cross sectional study.
- Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.
- Participants: Females who had been involved in commercial sex activity in the past six months were included.
- Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

- Methodology: A total of two hundred and ten FSWs were sought through “snowball” sampling technique. Face to face interview was done with each participant where data regarding their depression status, HIV high risk behavior and violence were recorded.
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In our study, 81.35% of respondents fall in the high depressive category. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. Similarly, the respondents who were involved in any HIV high risk behavior were six times more likely to be depressed than those who were not.

- Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect in HIV prevention efforts which will help to promote overall health of this population.

INTRODUCTION

FSWs (FSWs) represent a marginalized population that faces many occupational hazards. They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and consequent stigmatization. Previous studies conclude presence of various dimensions which make FSWs accept atrocities which this profession has to offer. One of the dimensions relate to the legislative structure in which they operate. In Nepal, there are no clear rules and regulations regarding legality of prostitution. Thus, where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[1] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[2-4] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[5] Due to the world wide concern regarding spread of human immunodeficiency virus / acquired immune deficiency syndrome (HIV/AIDS) through this group, preventive measures are focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or in particular on the mental health consequences of sex work.[6] As a result, the mental health needs of this stigmatized population is generally ignored. This triggers a thought that mental health could play an important role in involvement in risky behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors.

Alternatively, when one is in the sex trade the fear of contracting HIV/AIDS is a serious concern. In spite of use of contraception, one cannot be 100 percent sure about being safe from HIV. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioural surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive symptoms of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior and support behavior change, and even improve health outcomes.

MATERIAL AND METHODS

A descriptive study was conducted in three districts of eastern Nepal. The FSWs who had been involved in commercial sex activity in the past six months were included in the study. A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96 *70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district. The sex workers were contacted through Snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area.

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c) Has anyone done things to scare or intimidate you on purpose?

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A positive response to any one of the above eight questions was regarded as suffering from violence in the workplace. The women who had been suffered from any form of violence and had been involved in HIV risk behavior in the past six months at their workplace (street/restaurant) after joining sex trade were included.

The questions were originally prepared in English and later translated into Nepali for collection of data according to standard translation guidelines. Completed questionnaires without any missing data were only included in the study as repeating of interviews would have been difficult due to high mobility of the study population.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL) .Odds Ratios were calculated to assess association of depression with variables of HIV high risk behavior and violence. Finally, Binary Logistic regression analysis with backward elimination was used to identify significant predictors of depression among the associated independent variables.

Ethical approval was taken from the institutional ethical review board. Informed consent was taken from each respondent. Confidentiality and anonymity was assured and maintained.

RESULTS:

The prevalence of depression in our study was 81.4%. The FSWs who had been insulted were three times more likely to report depressive symptoms than those who had not (OR 3.28, 95%CI 1.50, 7.20) as shown in table 1. The respondents who were humiliated in front of others were twice likely to be having depression (OR 2.46, 95%CI 1.06, 5.70). The risk of depression was about seven times higher among the FSWs who gave a positive history of suffering from any form of violence (OR 6.96, 95% CI 3.21, 15.08).

Table 2 shows that the distribution of proportion for individual HIV high risk behaviors was not hugely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). The risk of depression was three times higher in FSWs who had been involved in any one of the mentioned high risk behavior (OR 3.20, 95%CI 1.44, 7.11) .

Logistic regression analyses revealed that women who had experienced any form of violence in the last six months had more than five times higher chance of being in depressive category than respondents who had not (AOR 5.896, 95% CI 2.22, 15.63) as shown in table 3. Similarly, FSWs who were involved in at least one mentioned HIV risk behavior were six times more likely to be in higher depressive category (AOR 6.037, 95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significantly associated with depression.

DISCUSSION:

In our study, the prevalence of depression among FSWs was 81.40 per cent. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the participants had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[12] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill themselves.[13] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio cultural characteristics. Comparable findings were seen in another study done by Algeria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[6] A Nigerian study concluded that in comparison with women of other occupational groups, FSWs were at greater risk of screening positive across many forms of psychopathology. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[7]

In accordance with the previous research findings, the women experiencing violence were more likely to be depressed compared to those who did not. Similar conclusion was made by a study from India which aimed to assess the mental health status of 57 FSWs. Those respondents who experienced higher violence at work and at home had a higher measure of depression.[13] Harris M et al did a qualitative study to address the experiences of FSWs in urban Australia.

They have been diagnosed with bi-polar disorder, and been mentally abused by a former partner. [14] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among FSWs (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts. [15]

In the current study, FSWs being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.099, 17.369). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms. Injected drug users were about seven times more likely than those who did not inject drugs to reach high levels of depressive symptoms.[7] Heidi E. and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[16] In a study done in Australia, Logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [17]

Our study concludes that there is a high prevalence of depression among the FSWs of Eastern Nepal. It also infers significant association of HIV risk behavior and violence with depression.

The current study had several limitations. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the distress and mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice

their rights to say “NO” to their clients. They should be made to realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and think about ways to address the issues of this population.

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Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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TITLE

Violence, HIV risk behavior and depression among FSWs of eastern Nepal.

ABSTRACT

- Introduction

There is dearth of knowledge regarding mental health of FSWs (FSWs) of Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

- Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.
- Design: Cross sectional study.
- Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.
- Participants: Females who had been involved in commercial sex activity in the past six months were included.
- Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

- Methodology: A total of two hundred and ten FSWs were sought through “snowball” sampling technique. Face to face interview was done with each participant where data regarding their depression status, HIV high risk behavior and violence were recorded.
- Results:

In our study, 81.35% of respondents fall in the high depressive category. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. Similarly, the respondents who were involved in any HIV high risk behavior were six times more likely to be depressed than those who were not.

- Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect in HIV prevention efforts which will help to promote overall health of this population.

INTRODUCTION

FSWs (FSWs) represent a marginalized population that faces many occupational hazards. They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and consequent stigmatization. Previous studies conclude presence of various dimensions which make FSWs accept atrocities which this profession has to offer. One of the dimensions relate to the legislative structure in which they operate. In Nepal, there are no clear rules and regulations regarding legality of prostitution. Thus, where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[1] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[2-4] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[5] Due to the world wide concern regarding spread of human immunodeficiency virus / acquired immune deficiency syndrome (HIV/AIDS) through this group, preventive measures are focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or in particular on the mental health consequences of sex work.[6] As a result, the mental health needs of this stigmatized population is generally ignored. This triggers a thought that mental health could play an important role in involvement in risky behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors.

Alternatively, when one is in the sex trade the fear of contracting HIV/AIDS is a serious concern. In spite of use of contraception, one cannot be 100 percent sure about being safe from HIV. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioural surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive symptoms of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior and support behavior change, and even improve health outcomes.

MATERIAL AND METHODS

A descriptive study was conducted in three districts of eastern Nepal. The FSWs who had been involved in commercial sex activity in the past six months were included in the study. A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96*70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district. The sex workers were contacted through Snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area.

Depressive symptomatology was recorded using Centre for Epidemiological Studies: Depression scale (CES-D) which is 20 item scale in which a cut-off point of 16 is considered appropriate to differentiate respondents with depression.[8-9]

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syringe exchange; b) sex with intravenous drug user; c)sex under the influence of alcohol or drugs; d) oral sex; e) anal sex; f)Non-usage of condoms during every sexual encounter; g) pregnancy after joining the sex trade was considered as being involved in HIV high risk behavior.

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No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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STROBE STATEMEMENT

Item No	Recommendation	Main Document (page no.)
Title and abstract [1]	(a) Indicate the study's design with a commonly used term in the title or the abstract.	1
	(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction		
Background [2]	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives [3]	State specific objectives, including any pre specified hypotheses	4
Methods		
Study design [4]	Present key elements of study design early in the paper	4-5
Setting [5]	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	-
Participants [6]	Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables [7]	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	-
Data sources/ measurement [8]	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias [9]	Describe any efforts to address potential sources of bias	-
Study size [10]	Explain how the study size was arrived at	4-5
Quantitative variables [11]	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	-
Statistical methods [12]	(*a*) Describe all statistical methods, including those used to control for confounding	6
	(*b*) Describe any methods used to examine subgroups and interactions	-
	(*c*) Explain how missing data were addressed	6
	(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
	(*e*) Describe any sensitivity analyses	-
Results Participants [13]	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
	(b) Give reasons for non-participation at each stage	-
	(c) Consider use of a flow diagram	-
Descriptive data [14]	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
	(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data [15]	Report numbers of outcome events or summary measures	6
Main results [16]	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
	(*b*) Report category boundaries when continuous variables were categorized	-
	(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses [17]	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion		
Key results [18]	Summarise key results with reference to study objectives	7-8
Limitations [19]	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9

Interpretation [20]	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability [21]	Discuss the generalisability (external validity) of the study results	10
Other information		
Funding [22]	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10

REVISIONS IN THE MANUSCRIPTS

Reviewer: Amanda Roxburgh

Senior Researcher

National Drug and Alcohol Research Centre

University of New South Wales

Australia

1. General comments

If the authors could have someone carefully proof read the paper for readability and English grammar it would strengthen the paper.

Justification: The manuscript was given to all the authors and also to our colleagues to improve the readability and check for grammatical mistakes.

2. Abstract

I'd suggest the authors remove the confidence intervals from the abstract as they should really appear in the results.

Justification: Confidence intervals have been removed as per reviewer's comment.

3. Introduction

The authors state that the mental health of sex workers has largely been ignored in the literature however they then go on to quote some of this literature (the Puerto Rican study and a study conducted in China) in the discussion. There is a quite a large literature on mental health (PTSD, depression, drug dependence) among sex workers. The introduction would be improved if they reviewed some of this literature up front then stated how their paper adds to this literature (i.e.

what is unique about their study? Is it geographic uniqueness? Something that they've measured that hasn't been measured previously?).

Justification: We meant with respect to Nepal the mental health of sex workers is an ignored issue. Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

4. Material and Methods

a) Could the authors please spell out the sample size formula a bit more clearly as well as provide a citation or reference for it. It won't be clear to many readers what P is or that Q is 100-p. L also needs to be defined.

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

b) Apart from the syringe exchange measure, was there any data collected on drug or alcohol use? Substance use will be an important confounder when looking at mental health issues, and should be included as a predictor or at least controlled for in the regression model. If substance use was not collected then this should be mentioned as a limitation of the study.

Justification: Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study has been mentioned in the discussion.

c) Could the authors please provide a reference for the SPSS package used.

Justification: The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL) .

5. Results

a) The authors could probably remove table 1 and just report the percentages and numbers in text. It doesn't really add much to present it as a table.

Justification: The table 1 has been removed and results has been reported in text.

b) Throughout the results where the authors state that FSW were x times more likely, could they please report the Odds Ratios (OR) and the 95% Confidence intervals (CI). There are 95% CIs throughout the results without the ORs reported.

Justification: The Odds Ratios and 95% CIs have been reported throughout the results.

c) On page 8 in the paragraph under the sub-heading RESULTS, could the authors change the following sentence from:

"Consequently, female sex workers who had been insulted had three times higher chances of suffering from depressive symptoms" to "However, female sex workers who had been insulted were three times more likely to report depressive symptoms than those who had not"

Justification: The sentence has been changed according to the reviewer's comment.

d) On page 9 in the last sentence of the results, could the authors please change the following sentence from: "Thus, our study shows that violence and HIV risk behaviour are significant predictors of depression." To: "Thus, our study shows that violence and HIV risk behaviours are significantly associated with depression."

Justification: The sentence has been changed according to the reviewer's comment.

e) Given that this is a cross-sectional study it's very hard to say what predicts depression, and it may be that the relationship goes the other way – e.g. women may be more likely to engage in HIV risk behaviors because they are depressed and their ability to negotiate safer practices may be impaired.

Justification: We have changed the sentence from "predicts depression" to associated with depression". Along with that, it has been mentioned as the limitation of the study in the discussion. We have stated that due to the cross sectional study design the temporal association

cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality.

6. Discussion

a) Page 10 in the first paragraph could the authors please change the following sentence from:"A Nigerian study concluded that in comparison with women of other occupational groups the female sex workers are psychopathological" To:"A Nigerian study concluded that in comparison with women of other occupational groups, female sex workers were at greater risk of screening positive across many forms of psychopathology."

Justification: The sentence has been changed according to the reviewer's comment.

b) The sentence beginning with "In accordance with popular belief" Should this read in accordance with previous research?

Justification: The sentence has been changed according to the reviewer's comment as we meant in accordance with previous research in our literature review.

c) ORs from other studies are not necessary in the discussion and could be removed.

Justification: The ORs have been reduced from the discussion section.

d) Page 11, second paragraph, should the opening sentence ". . . .violence are significant predictors of violence" read ". . . . violence are significant predictors for depression".

Justification: It was a error and the sentence has been changed according to the reviewer's comment.

e) Finally, I think it would round the discussion off nicely if the authors could suggest some useful public health initiatives that arise from their findings. For example, what sort of mental health initiatives or harm reduction campaigns would be useful? Would the provision of mental health care services for these women ameliorate some of the risks they take? Etc.

Justification: We have concluded the manuscript with the possible public health initiatives which can be feasible in Nepalese context. We have stated that we need to design our HIV prevention strategies in such a way that they address the distress and mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say "NO" to their clients. They should be made to realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and think about ways to address the issues of this population.

f) Table 2 and Table 3: This table would be easier to read without the no categories. Could the authors add a column and include the p values.

Justification: A column including P values has been introduced in all the tables. However, we have not removed the categories as we have tried to compare percentage distributions among the depressive and non-depressive category.

Reviewer: Allen Furr

Professor and Chair

Department of Sociology, Anthropology, and Social Work

Auburn University

USA

1.a.The introduction of the study should address the mental health of sex workers in general and Nepal in particular. As currently written, the introduction should include an argument as to why the research question is important and how it was derived or deduced. In short, the study requires a better defined justification, beyond saying there is no literature on mental health of sex workers. Although authors state in the intro that there is no literature on this subject, they provide a literature review in the concluding section of the paper.

Justification: Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioural surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We have mentioned many studies related to the current topic but we could not mention a single study from Nepal. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

1.b. Also in the intro, the authors discuss three "dimensions" without specifying dimensions of any particular factor. In other words, what are these dimensions of?

Justification: These dimensions are not part of any one particular factor. There can be many more dimensions which increase vulnerability of female sex workers to accept atrocities which this profession has to offer. We have mentioned a few which were discussed in previous studies.

1.c. The design of the study appears exploratory; however, given that there are a number of studies that document that sex workers suffer more mental health problems (and one that doesn't, which the authors do not reference), the case needs to be made as to why sex workers in Nepal require special research attention.

Justification: Although, there are studies which state that women in sex trade can be more psychopathological compared to women in other profession we could not find researches and inquiries in Nepalese context. Our main interest was to investigate whether in our geographical context the scenario is similar or different.

2. Methods: (a) the terms in the sample size calculation must be specified;

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

(b) that 70% of Puerto Rican sex workers are depressed should be reported in the literature review section;

Justification: This has been changed according to reviewer's comment.

(c) what is the justification for the HIV variable? No reasons stated for its relevance in the introduction.

Justification: During our rapport building, we had realized that a lot of women wanted to quit the profession due to fear of contracting HIV/AIDS. This has been explained in the introduction with a thought that mental health could play an important role in involvement in risky behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. Alternatively, when one is in the sex trade the fear of contracting HIV/AIDS is a serious concern. In spite of use of contraception, one cannot be 100 percent sure about being safe from HIV. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

3. The authors state that health research is limited to the study of customers of sex workers; however, there are many studies on the health of sex workers.

Justification: We wanted to focus that health research and various bio behavioral surveys in Nepal are concerned about overall health, HIV status and use of condoms among sex workers and their clients with very little emphasis on mental health of sex workers.

4. The questions on psychological abuse and violence should be stated.

Justification: All the questions of violence are now included in the methodology. The questions related to psychological violence are as follows:

a) Has anyone insulted you or made you feel bad about yourself?

b) Has anyone belittled or humiliated you in front of other people?

c) Has anyone done things to scare or intimidate you on purpose?

d) Has anyone threatened to hurt you or someone you care about?

5. The finding that having been insulted correlates with depression may be spurious because we cannot determine the severity or duration of the insulting behavior. If it occurred only once, I find it hard to believe that such an one-off incident can cause clinical depression.

Justification: During our conversations with respondents, psychological violence was very high and frequent too but our fault, we did not record the severity or duration of any form of violence. And this concern has been included as another limitation of our study.

6. On Page 10, the authors state "In accordance with the popular belief" women experiencing violence become more depressed. What is meant by "popular belief" is not clear.

Justification: We meant in accordance with our literature review of previous researches in the same topic and the sentence has been corrected.

7. On Page 11, the authors state that they cannot infer that sex workers become depressed before or after entering the trade. The Results Section, however, stated that HIV and violence are predictors of depression, which implies temporal order of events. The violence measured in the study is workplace violence, as stated on page 7, which further clouds the matter.

Justification: We have stated that a cross sectional study cannot infer predictors thus, we have stated that HIV risk behavior and violence were associated with depression among our study population during that particular time period. When we interviewed the sex workers, we included women who were involved in commercial sex activity in the past six months and also women who had experience any form of violence in past six months only at their workplace. Thus, throughout the manuscript violence refers to workplace violence in the past six months which has been clarified in the methods section.

8. If the researchers want to study HIV risk behavior in relation to depression, they should entertain the notion that depression may cause or at least precede the high-risk behavior.

Justification: In the introduction, where we have justified the need to study HIV variable we also have stressed upon the fact that risky behaviors can have an impact on the mental health of the sex workers and the possibility of depressed women being involved in high risk behavior. Then, again the temporality is a concern.

9. The authors conclude that several of the violence variables predict depression. However, there are no controls in the models that allow us to know how much of the variance in depression is due to those variables. For example, regarding the psychological abuse variables, 90% of those

women having been insulted score high on the depression measure. However, 73% of those not experiencing an insult also reported high depression scores. The depression rate seems high either way. For intimidation, 91% having experienced intimidation report depression; however, 80% of those not experiencing intimidation were also depressed. Controls are needed in the equations to determine if these variables are spurious. Other variables are similarly positioned.

Justification: We have realized that since it is a cross sectional study the sentence that violence and HIV risk behavior are predictors of depression is not appropriate. The temporal sequence cannot be predicted. Thus, we have changed it to associated factors of depression are violence and HIV risk behavior in the current study. However, this study might be a good basis to start new researches in the similar direction. Absence of controls which makes it difficult to understand the amount of variance due to the associated variables has been included as one of the limitations of the study.

10. There may be a typo in the "pushed or shoved" variable for "yes".

Justification: Yes, there was an error in typing which has been corrected.

BMJ open

Violence, HIV risk behavior and depression among female sex workers of Eastern Nepal.

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-002763.R2
Article Type:	Research
Date Submitted by the Author:	20-Apr-2013
Complete List of Authors:	Sagtani, Reshu; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Bhattarai, Sailesh; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Adhikari, Baikuntha; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Baral, Dharanidhar; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Yadav, Deepak; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Pokharel, Paras; B.P.Koirala Institute of Health Sciences, School of public health and community medicine
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Public health
Keywords:	EPIDEMIOLOGY, Depression & mood disorders < PSYCHIATRY, HIV & AIDS < INFECTIOUS DISEASES

TITLE

Violence, HIV risk behavior and depression among FSWs of eastern Nepal.

ABSTRACT

- Introduction

There is dearth of knowledge regarding mental health of FSWs (FSWs) of Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

- Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.
- Design: Cross sectional study.
- Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.
- Participants: Females who had been involved in commercial sex activity in the past six months were included.
- Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

- Methodology: A total of two hundred and ten FSWs were sought through “snowball” sampling technique. Face to face interview was done with each participant where data regarding their depression status, HIV high risk behavior and violence were recorded.
- Results:

In our study, 81.35% of respondents fall in the high depressive category. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. Similarly, the respondents who were involved in any HIV high risk behavior were six times more likely to be depressed than those who were not.

- Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect in HIV prevention efforts which will help to promote overall health of this population.

INTRODUCTION

Female Sex Workers (FSWs) represent a marginalized population that faces many occupational hazards. They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and stigmatization. Various studies have concluded that there are various dimensions which make FSWs accept atrocities which this profession has to offer. One of the dimensions is related to the legislative structure of the country in which they operate. In countries where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[1] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[2-4] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[5]

Mental health could play an important role in involvement of an individual in high risk behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. On the other hand, the fear of contracting HIV/AIDS is a serious concern among commercial sex workers. In spite of taking necessary precautions, there are no guarantees about being absolutely safe from HIV/AIDS. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio highlights enormous need of mental health professionals to provide services to the general population. In this scenario, it can be difficult for an individual to be diagnosed and seek treatment for mental illness like depression which is often easily misdiagnosed for bad or low mood.

Due to the world wide concern regarding spread of HIV/AIDS through this group, preventive measures are many of the times focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or mental health consequences of sex work in particular.[6] As a result, the mental health needs of this population is generally ignored. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. This is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive symptoms of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. Less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior and support behavior change, and even improve health outcomes.

MATERIAL AND METHODS

A descriptive study was conducted in three districts of eastern Nepal. The FSWs who had been involved in commercial sex activity in the past six months were included. A total of 210 FSWs agreed to participate in the study. The sample size was derived from a similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size (n)} = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96 *70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

Thus, amplifying by 10% for possible non - response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district. The sex workers were contacted through snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area. Depressive symptomatology was recorded using Centre for Epidemiological Studies: Depression scale (CES-D) which is 20 item scale in which a cut-off point of 16 is considered appropriate to differentiate respondents with depression.[8-9] Questions regarding HIV risk behavior was adapted from Family Health International - HIV/AIDS/STD Behavioral Surveillance Surveys: for use with FSWs.[10] Positive history of a) syringe exchange; b) sex with intravenous drug user; c)sex under the influence of alcohol or drugs; d) oral sex; e) anal sex; f)Non-usage of condoms

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A positive response to any one of the above eight questions was regarded as suffering from violence in the workplace. The women who had been suffered from any form of violence and had been involved in HIV risk behavior in the past six months at their workplace (street/restaurant) after joining sex trade were included.

The questions were originally prepared in English and later translated into Nepali for collection of data according to standard translation guidelines. Completed questionnaires without any missing data were only included in the study as repeating of interviews would have been difficult due to high mobility of the study population.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL). Odds Ratios were calculated to assess association of depression with variables of HIV high risk behavior and violence. Finally, Binary Logistic regression analysis with backward elimination was used to identify significant predictors of depression among the associated independent variables.

Ethical approval was taken from the institutional ethical review board. Informed consent was taken from each respondent. Confidentiality and anonymity was assured and maintained.

RESULTS:

A total of 173 respondents fell in the higher depressive category making the prevalence of depression among female sex workers of eastern Nepal to be 81.4% . The FSWs who had been insulted were three times more likely to report depressive symptoms than those who had not (OR 3.28, 95%CI 1.50, 7.20) as shown in table 1. The respondents who were humiliated in front of others were twice likely to be having depression (OR 2.46, 95%CI 1.06, 5.70). The risk of depression was about seven times higher among the FSWs who gave a positive history of suffering from any form of violence (OR 6.96, 95% CI 3.21, 15.08).

Table 2 shows that the distribution of proportion for individual HIV high risk behaviors was not largely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). The risk of depression was three times higher in FSWs who had been involved in any one of the mentioned high risk behavior (OR 3.20, 95%CI 1.44, 7.11).

Logistic regression analyses revealed that women who had experienced any form of violence in the last six months had more than five times higher chance of being in depressive category than respondents who had not (AOR 5.896, 95% CI 2.22, 15.63) as shown in table 3. Similarly, FSWs who were involved in at least one mentioned HIV risk behavior were six times more likely to be in higher depressive category (AOR 6.037, 95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significantly associated with depression.

DISCUSSION:

In our study, the prevalence of depression among FSWs was 81.4 per cent. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the sex workers had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[12] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill themselves.[13] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio cultural characteristics. Comparable findings were seen in another study done by Algeria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[6] A Nigerian study concluded that in comparison with women of other occupational groups, FSWs were at greater risk of screening positive across many forms of psychopathology. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[7]

In accordance with the previous studies, the women experiencing violence were more likely to be depressed compared to those who did not in the current study too. An Indian study concluded that FSWs who experienced higher violence at work and at home had a higher measure of depression.[13] Harris M et al did a qualitative study to address the experiences of FSWs in urban Australia. They have been diagnosed with bi-polar disorder, and been mentally

abused by a former partner. [14] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among FSWs (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts. [15]

In the current study, FSWs being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.099, 17.369). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms. Injected drug users were about seven times more likely than those who did not inject drugs to reach high levels of depressive symptoms.[7] Heidi E. and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[16] In a study done in Australia, Logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [17]

Our study concludes that there is a high prevalence of depression among the FSWs of Eastern Nepal. It also infers significant association of HIV risk behavior and violence with depression.

There are several limitations of the current cross sectional study. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say

depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say “NO” to their clients. We need to help them realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent.

Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and they should implement ways to address the issues of this population.

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Competing interests: none declared.

Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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TITLE

Violence, HIV risk behavior and depression among FSWs of eastern Nepal.

ABSTRACT

- Introduction

There is dearth of knowledge regarding mental health of FSWs (FSWs) of Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

- Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.
- Design: Cross sectional study.
- Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.
- Participants: Females who had been involved in commercial sex activity in the past six months were included.
- Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

- Methodology: A total of two hundred and ten FSWs were sought through “snowball” sampling technique. Face to face interview was done with each participant where data regarding their depression status, HIV high risk behavior and violence were recorded.
- Results:

In our study, 81.35% of respondents fall in the high depressive category. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. Similarly, the respondents who were involved in any HIV high risk behavior were six times more likely to be depressed than those who were not.

- Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect in HIV prevention efforts which will help to promote overall health of this population.

INTRODUCTION

Female Sex Workers (FSWs) represent a marginalized population that faces many occupational hazards. They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and stigmatization. Various studies have concluded that there are various dimensions which make FSWs accept atrocities which this profession has to offer. One of the dimensions is related to the legislative structure of the country in which they operate. In countries where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[1] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[2-4] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[5]

Mental health could play an important role in involvement of an individual in high risk behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. On the other hand, the fear of contracting HIV/AIDS is a serious concern among commercial sex workers. In spite of taking necessary precautions, there are no guarantees about being absolutely safe from HIV/AIDS. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio highlights enormous need of mental health professionals to provide services to the general population. In this scenario, it can be difficult for an individual to be diagnosed and seek treatment for mental illness like depression which is often easily misdiagnosed for bad or low mood.

Due to the world wide concern regarding spread of HIV/AIDS through this group, preventive measures are many of the times focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or mental health consequences of sex work in particular.[6] As a result, the mental health needs of this population is generally ignored. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. This is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive symptoms of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. Less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior and support behavior change, and even improve health outcomes.

MATERIAL AND METHODS

A descriptive study was conducted in three districts of eastern Nepal. The FSWs who had been involved in commercial sex activity in the past six months were included. A total of 210 FSWs agreed to participate in the study. The sample size was derived from a similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size (n)} = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96 *70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

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No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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STROBE STATEMEMENT

Item No	Recommendation	Main Document (page no.)
Title and abstract [1]	(a) Indicate the study's design with a commonly used term in the title or the abstract.	1
	(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction		
Background [2]	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives [3]	State specific objectives, including any pre specified hypotheses	4
Methods		
Study design [4]	Present key elements of study design early in the paper	4-5
Setting [5]	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	-
Participants [6]	Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables [7]	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	-
Data sources/ measurement [8]	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias [9]	Describe any efforts to address potential sources of bias	-
Study size [10]	Explain how the study size was arrived at	4-5
Quantitative variables [11]	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	-
Statistical methods [12]	(*a*) Describe all statistical methods, including those used to control for confounding	6
	(*b*) Describe any methods used to examine subgroups and interactions	-
	(*c*) Explain how missing data were addressed	6
	(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
	(*e*) Describe any sensitivity analyses	-
Results Participants [13]	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
	(b) Give reasons for non-participation at each stage	-
	(c) Consider use of a flow diagram	-
Descriptive data [14]	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
	(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data [15]	Report numbers of outcome events or summary measures	6
Main results [16]	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
	(*b*) Report category boundaries when continuous variables were categorized	-
	(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses [17]	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion		
Key results [18]	Summarise key results with reference to study objectives	7-8
Limitations [19]	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9

Interpretation [20]	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability [21]	Discuss the generalisability (external validity) of the study results	10
Other information		
Funding [22]	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10

REVISIONS IN THE MANUSCRIPTS

Reviewer: Amanda Roxburgh

Senior Researcher

National Drug and Alcohol Research Centre

University of New South Wales

Australia

1. General comments

If the authors could have someone carefully proof read the paper for readability and English grammar it would strengthen the paper.

Justification: The manuscript was given to all the authors and also to our colleagues to improve the readability and check for grammatical mistakes.

2. Abstract

I'd suggest the authors remove the confidence intervals from the abstract as they should really appear in the results.

Justification: Confidence intervals have been removed as per reviewer's comment.

3. Introduction

The authors state that the mental health of sex workers has largely been ignored in the literature however they then go on to quote some of this literature (the Puerto Rican study and a study conducted in China) in the discussion. There is a quite a large literature on mental health (PTSD, depression, drug dependence) among sex workers. The introduction would be improved if they reviewed some of this literature up front then stated how their paper adds to this literature (i.e.

what is unique about their study? Is it geographic uniqueness? Something that they've measured that hasn't been measured previously?).

Justification: We meant with respect to Nepal the mental health of sex workers is an ignored issue. Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

4. Material and Methods

a) Could the authors please spell out the sample size formula a bit more clearly as well as provide a citation or reference for it. It won't be clear to many readers what P is or that Q is 100-p. L also needs to be defined.

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

b) Apart from the syringe exchange measure, was there any data collected on drug or alcohol use? Substance use will be an important confounder when looking at mental health issues, and should be included as a predictor or at least controlled for in the regression model. If substance use was not collected then this should be mentioned as a limitation of the study.

Justification: Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study has been mentioned in the discussion.

c) Could the authors please provide a reference for the SPSS package used.

Justification: The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL) .

5. Results

a) The authors could probably remove table 1 and just report the percentages and numbers in text. It doesn't really add much to present it as a table.

Justification: The table 1 has been removed and results has been reported in text.

b) Throughout the results where the authors state that FSW were x times more likely, could they please report the Odds Ratios (OR) and the 95% Confidence intervals (CI). There are 95% CIs throughout the results without the ORs reported.

Justification: The Odds Ratios and 95% CIs have been reported throughout the results.

c) On page 8 in the paragraph under the sub-heading RESULTS, could the authors change the following sentence from:

"Consequently, female sex workers who had been insulted had three times higher chances of suffering from depressive symptoms" to "However, female sex workers who had been insulted were three times more likely to report depressive symptoms than those who had not"

Justification: The sentence has been changed according to the reviewer's comment.

d) On page 9 in the last sentence of the results, could the authors please change the following sentence from: "Thus, our study shows that violence and HIV risk behaviour are significant predictors of depression." To: "Thus, our study shows that violence and HIV risk behaviours are significantly associated with depression."

Justification: The sentence has been changed according to the reviewer's comment.

e) Given that this is a cross-sectional study it's very hard to say what predicts depression, and it may be that the relationship goes the other way – e.g. women may be more likely to engage in HIV risk behaviors because they are depressed and their ability to negotiate safer practices may be impaired.

Justification: We have changed the sentence from "predicts depression" to associated with depression". Along with that, it has been mentioned as the limitation of the study in the discussion. We have stated that due to the cross sectional study design the temporal association

cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality.

6. Discussion

a) Page 10 in the first paragraph could the authors please change the following sentence from:"A Nigerian study concluded that in comparison with women of other occupational groups the female sex workers are psychopathological" To:"A Nigerian study concluded that in comparison with women of other occupational groups, female sex workers were at greater risk of screening positive across many forms of psychopathology."

Justification: The sentence has been changed according to the reviewer's comment.

b) The sentence beginning with "In accordance with popular belief" Should this read in accordance with previous research?

Justification: The sentence has been changed according to the reviewer's comment as we meant in accordance with previous research in our literature review.

c) ORs from other studies are not necessary in the discussion and could be removed.

Justification: The ORs have been reduced from the discussion section.

d) Page 11, second paragraph, should the opening sentence ". . . .violence are significant predictors of violence" read ". . . . violence are significant predictors for depression".

Justification: It was a error and the sentence has been changed according to the reviewer's comment.

e) Finally, I think it would round the discussion off nicely if the authors could suggest some useful public health initiatives that arise from their findings. For example, what sort of mental health initiatives or harm reduction campaigns would be useful? Would the provision of mental health care services for these women ameliorate some of the risks they take? Etc.

Justification: We have concluded the manuscript with the possible public health initiatives which can be feasible in Nepalese context. We have stated that we need to design our HIV prevention strategies in such a way that they address the distress and mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say "NO" to their clients. They should be made to realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and think about ways to address the issues of this population.

f) Table 2 and Table 3: This table would be easier to read without the no categories. Could the authors add a column and include the p values.

Justification: A column including P values has been introduced in all the tables. However, we have not removed the categories as we have tried to compare percentage distributions among the depressive and non-depressive category.

Reviewer: Allen Furr

Professor and Chair

Department of Sociology, Anthropology, and Social Work

Auburn University

USA

1.a.The introduction of the study should address the mental health of sex workers in general and Nepal in particular. As currently written, the introduction should include an argument as to why the research question is important and how it was derived or deduced. In short, the study requires a better defined justification, beyond saying there is no literature on mental health of sex workers. Although authors state in the intro that there is no literature on this subject, they provide a literature review in the concluding section of the paper.

Justification: Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioural surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We have mentioned many studies related to the current topic but we could not mention a single study from Nepal. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

1.b. Also in the intro, the authors discuss three "dimensions" without specifying dimensions of any particular factor. In other words, what are these dimensions of?

Justification: These dimensions are not part of any one particular factor. There can be many more dimensions which increase vulnerability of female sex workers to accept atrocities which this profession has to offer. We have mentioned a few which were discussed in previous studies.

1.c. The design of the study appears exploratory; however, given that there are a number of studies that document that sex workers suffer more mental health problems (and one that doesn't, which the authors do not reference), the case needs to be made as to why sex workers in Nepal require special research attention.

Justification: Although, there are studies which state that women in sex trade can be more psychopathological compared to women in other profession we could not find researches and inquiries in Nepalese context. Our main interest was to investigate whether in our geographical context the scenario is similar or different.

2. Methods: (a) the terms in the sample size calculation must be specified;

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

(b) that 70% of Puerto Rican sex workers are depressed should be reported in the literature review section;

Justification: This has been changed according to reviewer's comment.

(c) what is the justification for the HIV variable? No reasons stated for its relevance in the introduction.

Justification: During our rapport building, we had realized that a lot of women wanted to quit the profession due to fear of contracting HIV/AIDS. This has been explained in the introduction with a thought that mental health could play an important role in involvement in risky behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. Alternatively, when one is in the sex trade the fear of contracting HIV/AIDS is a serious concern. In spite of use of contraception, one cannot be 100 percent sure about being safe from HIV. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

3. The authors state that health research is limited to the study of customers of sex workers; however, there are many studies on the health of sex workers.

Justification: We wanted to focus that health research and various bio behavioral surveys in Nepal are concerned about overall health, HIV status and use of condoms among sex workers and their clients with very little emphasis on mental health of sex workers.

4. The questions on psychological abuse and violence should be stated.

Justification: All the questions of violence are now included in the methodology. The questions related to psychological violence are as follows:

a) Has anyone insulted you or made you feel bad about yourself?

b) Has anyone belittled or humiliated you in front of other people?

c) Has anyone done things to scare or intimidate you on purpose?

d) Has anyone threatened to hurt you or someone you care about?

5. The finding that having been insulted correlates with depression may be spurious because we cannot determine the severity or duration of the insulting behavior. If it occurred only once, I find it hard to believe that such an one-off incident can cause clinical depression.

Justification: During our conversations with respondents, psychological violence was very high and frequent too but our fault, we did not record the severity or duration of any form of violence. And this concern has been included as another limitation of our study.

6. On Page 10, the authors state "In accordance with the popular belief" women experiencing violence become more depressed. What is meant by "popular belief" is not clear.

Justification: We meant in accordance with our literature review of previous researches in the same topic and the sentence has been corrected.

7. On Page 11, the authors state that they cannot infer that sex workers become depressed before or after entering the trade. The Results Section, however, stated that HIV and violence are predictors of depression, which implies temporal order of events. The violence measured in the study is workplace violence, as stated on page 7, which further clouds the matter.

Justification: We have stated that a cross sectional study cannot infer predictors thus, we have stated that HIV risk behavior and violence were associated with depression among our study population during that particular time period. When we interviewed the sex workers, we included women who were involved in commercial sex activity in the past six months and also women who had experience any form of violence in past six months only at their workplace. Thus, throughout the manuscript violence refers to workplace violence in the past six months which has been clarified in the methods section.

8. If the researchers want to study HIV risk behavior in relation to depression, they should entertain the notion that depression may cause or at least precede the high-risk behavior.

Justification: In the introduction, where we have justified the need to study HIV variable we also have stressed upon the fact that risky behaviors can have an impact on the mental health of the sex workers and the possibility of depressed women being involved in high risk behavior. Then, again the temporality is a concern.

9. The authors conclude that several of the violence variables predict depression. However, there are no controls in the models that allow us to know how much of the variance in depression is due to those variables. For example, regarding the psychological abuse variables, 90% of those

women having been insulted score high on the depression measure. However, 73% of those not experiencing an insult also reported high depression scores. The depression rate seems high either way. For intimidation, 91% having experienced intimidation report depression; however, 80% of those not experiencing intimidation were also depressed. Controls are needed in the equations to determine if these variables are spurious. Other variables are similarly positioned.

Justification: We have realized that since it is a cross sectional study the sentence that violence and HIV risk behavior are predictors of depression is not appropriate. The temporal sequence cannot be predicted. Thus, we have changed it to associated factors of depression are violence and HIV risk behavior in the current study. However, this study might be a good basis to start new researches in the similar direction. Absence of controls which makes it difficult to understand the amount of variance due to the associated variables has been included as one of the limitations of the study.

10. There may be a typo in the "pushed or shoved" variable for "yes".

Justification: Yes, there was an error in typing which has been corrected.

BMJ open

Violence, HIV risk behavior and depression among female sex workers of Eastern Nepal.

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-002763.R3
Article Type:	Research
Date Submitted by the Author:	08-May-2013
Complete List of Authors:	Sagtani, Reshu; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Bhattarai, Sailesh; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Adhikari, Baikuntha; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Baral, Dharanidhar; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Yadav, Deepak; B.P.Koirala Institute of Health Sciences, School of public health and community medicine Pokharel, Paras; B.P.Koirala Institute of Health Sciences, School of public health and community medicine
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Public health
Keywords:	EPIDEMIOLOGY, Depression & mood disorders < PSYCHIATRY, HIV & AIDS < INFECTIOUS DISEASES

TITLE

Violence, HIV risk behavior and depression among female sex workers of eastern Nepal.

ABSTRACT

Introduction

There is dearth of knowledge regarding mental health of Female Sex Workers (FSWs) in Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.

Design: Cross sectional/ Observational study.

Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.

Participants: Females who had been involved in commercial sex activity in the past six months and gave informed consent were included in the study.

Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

Methodology: Face to face interviews were done with the respondents who were sought through snowball sampling technique. Information regarding their depression status, HIV high risk behavior and violence was recorded. The estimated sample size was two hundred and ten.

Results:

We interviewed two hundred and twenty FSWs (restaurant and street based). The prevalence of depression among respondents was 81.4%. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. The odds of depression was six times higher among respondents who were involved in any HIV risk behavior compared to those who were not involved.

Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect of HIV prevention efforts which can help to promote overall health of this population.

INTRODUCTION

Female Sex Workers (FSWs) represent a marginalized population that faces many occupational hazards.[1] They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and stigmatization.[1-2] Number of studies have concluded that there are various domains which make sex workers a disadvantaged group which makes it an multidimensional issue. [3-4] One of the dimensions is related to the legislative structure of the country in which they operate. In countries where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[5] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[6-8] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[9]

Poor mental health plays an important role in involvement of an individual in high risk behaviors.[10] More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. [11] On the other hand, the fear of contracting HIV/AIDS could be a serious concern among commercial sex workers as effectiveness of condoms in preventing HIV and STIs has not been proven to be 100% till date. [12]

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio highlights enormous need of mental health professionals to provide services to the general population. In this scenario, it can be difficult for an individual to be diagnosed and seek treatment for mental illness like depression which is often easily misdiagnosed for bad or low mood. [13]

Due to the world wide concern regarding spread of HIV/AIDS through this group, preventive measures are many of the times focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or mental health consequences of sex work in particular.[14] As a result, the mental health needs of this population is generally ignored. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive status of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. Less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior, support behavior change and even improve health outcomes.

MATERIAL AND METHODS

An observational study was conducted in three districts of eastern Nepal. FSWs who had been involved in commercial sex activity in the past six months who gave informed consent were included. The sample size was derived from a similar study which revealed prevalence of depression diagnosed through CES-D scale among FSWs to be 70%.[11] By using the formula for sample size calculation:

$$\text{Sample Size (n)} = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96 *70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

Thus, amplifying by 10% for possible non - response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We planned to interview 210 FSWs, 70 from each district. The sex workers were contacted through snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area. Depressive symptomatology was recorded using Centre for Epidemiological Studies: Depression scale (CES-D) which is 20 item scale in which a cut-off point of 16 is considered appropriate to differentiate respondents with depression.[15-16] Questions regarding HIV risk behavior was adapted from Family Health International - HIV/AIDS/STD Behavioral Surveillance Surveys: for use with FSWs.[17] Positive history of a) syringe exchange; b) sex with intravenous drug user; c)sex under the influence of alcohol or drugs; d) oral sex; e) anal sex; f)Non-usage of

condoms during every sexual encounter; g) pregnancy after joining the sex trade was considered as being involved in HIV high risk behavior. Questions regarding work related violence adapted from questionnaire developed during WHO multi-country study on women's health and domestic violence Against women. [18] The questions for recording psychological violence were:

a) Has anyone insulted you or made you feel bad about yourself?

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The questions for recording physical violence were:

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Criteria for sexual violence was a positive response to the following questions:

a) Have you ever been raped or sexually assaulted?

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A positive response to any one of the above eight questions was regarded as suffering from violence in the workplace. The women who had been suffered from any form of violence and

had been involved in HIV risk behavior in the past six months at their workplace (street/restaurant) after joining sex trade were included.

The questions were originally prepared in English and later translated into Nepali for collection of data according to standard translation guidelines. Completed questionnaires without any missing data were only included in the study as repeating of interviews would have been difficult due to high mobility of the study population.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL). Odds Ratios were calculated to assess association of depression with variables of HIV high risk behavior and violence. Significant variables from bivariate analysis ($p < 0.05$) were then entered into binary logistic regression model with backward elimination. Ethical approval was taken from the institutional ethical review board. Informed consent was taken from each respondent. Confidentiality and anonymity was assured and maintained.

RESULTS:

A total of 210 FSWs were interviewed of which, 173 respondents fell in the higher depressive category making the prevalence of depression among FSWs of eastern Nepal to be 81.4% . The FSWs who had been insulted were three times more likely to report depressive symptoms than those who had not (OR 3.28, 95%CI 1.50, 7.20) as shown in table 1. The respondents who were humiliated in front of others were twice likely to be having depression (OR 2.46, 95%CI 1.06, 5.70). The risk of depression was about seven times higher among the FSWs who gave a positive history of suffering from any form of violence (OR 6.96, 95% CI 3.21, 15.08).

Table 2 shows that the distribution of proportion for individual HIV high risk behaviors was not largely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). The risk of depression was three times higher in FSWs who had been involved in any one of the mentioned high risk behavior (OR 3.20, 95%CI 1.44, 7.11).

Logistic regression analyses revealed that women who had experienced any form of violence in the last six months had more than five times higher chance of being in depressive category than respondents who had not (AOR 5.896, 95% CI 2.22, 15.63) as shown in table 3. Similarly, FSWs who were involved in at least one mentioned HIV risk behavior were six times more likely to be in higher depressive category (AOR 6.037, 95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significantly associated with depression.

DISCUSSION:

In our study, the prevalence of depression among FSWs was 81.4 per cent. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the sex workers had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[19] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill themselves.[20] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio

cultural characteristics. Comparable findings were seen in another study done by Alegria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[11] A Nigerian study concluded that in comparison with women of other occupational groups, FSWs were at greater risk of screening positive across many forms of psychopathology. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[14]

In accordance with the previous studies, the women experiencing violence were more likely to be depressed compared to those who did not in the current study too. An Indian study concluded that FSWs who experienced higher violence at work and at home had a higher measure of depression.[20] Harris M et al did a qualitative study to address the experiences of FSWs in urban Australia. They have been diagnosed with bi-polar disorder, and been mentally abused by a former partner. [21] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among FSWs (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts. [22]

In the current study, FSWs being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.099, 17.369). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms. Injected drug users were about seven times more likely than

those who did not inject drugs to reach high levels of depressive symptoms.[11] Hutton HE and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[12] In a study done in Australia, Logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [23]

Our study concludes that there is a high prevalence of depression among the FSWs of Eastern Nepal. It also infers significant association of HIV risk behavior and violence with depression.

There are several limitations of the current cross sectional study. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded

which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say “NO” to their clients. We need to help them realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and they should implement ways to address the issues of this population.

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Funding: No funding was available.

Competing interests: none declared.

Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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TITLE

Violence, HIV risk behavior and depression among female sex workers of eastern Nepal.

ABSTRACT

Introduction

There is dearth of knowledge regarding mental health of Female Sex Workers (FSWs) in Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.

Design: Cross sectional/ Observational study.

Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.

Participants: Females who had been involved in commercial sex activity in the past six months and gave informed consent were included in the study.

Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

Methodology: Face to face interviews were done with the respondents who were sought through snowball sampling technique. Information regarding their depression status, HIV high risk behavior and violence was recorded. The estimated sample size was two hundred and ten.

Results:

We interviewed two hundred and twenty FSWs (restaurant and street based). The prevalence of depression among respondents was 81.4%. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. The odds of depression was six times higher among respondents who were involved in any HIV risk behavior compared to those who were not involved.

Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect of HIV prevention efforts which can help to promote overall health of this population.

INTRODUCTION

Female Sex Workers (FSWs) represent a marginalized population that faces many occupational hazards.[1] They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and stigmatization.[1-2] Number of studies have concluded that there are various domains which make sex workers a disadvantaged group which makes it an multidimensional issue. [3-4] One of the dimensions is related to the legislative structure of the country in which they operate. In countries where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[5] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[6-8] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[9]

Poor mental health plays an important role in involvement of an individual in high risk behaviors.[10] More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. [11] On the other hand, the fear of contracting HIV/AIDS could be a serious concern among commercial sex workers as effectiveness of condoms in preventing HIV and STIs has not been proven to be 100% till date. [12]

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio highlights enormous need of mental health professionals to provide services to the general population. In this scenario, it can be difficult for an individual to be diagnosed and seek treatment for mental illness like depression which is often easily misdiagnosed for bad or low mood. [13]

Due to the world wide concern regarding spread of HIV/AIDS through this group, preventive measures are many of the times focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or mental health consequences of sex work in particular.[14] As a result, the mental health needs of this population is generally ignored. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive status of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. Less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior, support behavior change and even improve health outcomes.

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There are several limitations of the current cross sectional study. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded

which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say “NO” to their clients. We need to help them realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and they should implement ways to address the issues of this population.

ACKNOWLEDGEMENTS

We would like to express our gratitude towards the respondents who gave us their valuable time for completion of this study. We are also grateful to the team of NGO-Sahara Nepal who helped us to locate the respondents and thus, facilitated data collection.

Funding: No funding was available.

Competing interests: none declared.

Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence					
Yes	10.3	89.7	6.96	3.21,	***<0.001**
No	44.4	55.6		15.08	

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.896	2.223	15.635
Involved in at least one risky behavior	.001	6.037	2.099	17.369

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from 5 different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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REVISIONS IN THE MANUSCRIPTS

Reviewer: Amanda Roxburgh

Senior Researcher

National Drug and Alcohol Research Centre

University of New South Wales

Australia

1. General comments

If the authors could have someone carefully proof read the paper for readability and English grammar it would strengthen the paper.

Justification: The manuscript was given to all the authors and also to our colleagues to improve the readability and check for grammatical mistakes.

2. Abstract

I'd suggest the authors remove the confidence intervals from the abstract as they should really appear in the results.

Justification: Confidence intervals have been removed as per reviewer's comment.

3. Introduction

The authors state that the mental health of sex workers has largely been ignored in the literature however they then go on to quote some of this literature (the Puerto Rican study and a study conducted in China) in the discussion. There is a quite a large literature on mental health (PTSD, depression, drug dependence) among sex workers. The introduction would be improved if they reviewed some of this literature up front then stated how their paper adds to this literature (i.e.

what is unique about their study? Is it geographic uniqueness? Something that they've measured that hasn't been measured previously?).

Justification: We meant with respect to Nepal the mental health of sex workers is an ignored issue. Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

4. Material and Methods

a) Could the authors please spell out the sample size formula a bit more clearly as well as provide a citation or reference for it. It won't be clear to many readers what P is or that Q is 100-p. L also needs to be defined.

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

b) Apart from the syringe exchange measure, was there any data collected on drug or alcohol use? Substance use will be an important confounder when looking at mental health issues, and should be included as a predictor or at least controlled for in the regression model. If substance use was not collected then this should be mentioned as a limitation of the study.

Justification: Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study has been mentioned in the discussion.

c) Could the authors please provide a reference for the SPSS package used.

Justification: The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL) .

5. Results

a) The authors could probably remove table 1 and just report the percentages and numbers in text. It doesn't really add much to present it as a table.

Justification: The table 1 has been removed and results has been reported in text.

b) Throughout the results where the authors state that FSW were x times more likely, could they please report the Odds Ratios (OR) and the 95% Confidence intervals (CI). There are 95% CIs throughout the results without the ORs reported.

Justification: The Odds Ratios and 95% CIs have been reported throughout the results.

c) On page 8 in the paragraph under the sub-heading RESULTS, could the authors change the following sentence from:

"Consequently, female sex workers who had been insulted had three times higher chances of suffering from depressive symptoms" to "However, female sex workers who had been insulted were three times more likely to report depressive symptoms than those who had not"

Justification: The sentence has been changed according to the reviewer's comment.

d) On page 9 in the last sentence of the results, could the authors please change the following sentence from: "Thus, our study shows that violence and HIV risk behaviour are significant predictors of depression." To: "Thus, our study shows that violence and HIV risk behaviours are significantly associated with depression."

Justification: The sentence has been changed according to the reviewer's comment.

e) Given that this is a cross-sectional study it's very hard to say what predicts depression, and it may be that the relationship goes the other way – e.g. women may be more likely to engage in HIV risk behaviors because they are depressed and their ability to negotiate safer practices may be impaired.

Justification: We have changed the sentence from "predicts depression" to associated with depression". Along with that, it has been mentioned as the limitation of the study in the discussion. We have stated that due to the cross sectional study design the temporal association

cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality.

6. Discussion

a) Page 10 in the first paragraph could the authors please change the following sentence from:"A Nigerian study concluded that in comparison with women of other occupational groups the female sex workers are psychopathological" To:"A Nigerian study concluded that in comparison with women of other occupational groups, female sex workers were at greater risk of screening positive across many forms of psychopathology."

Justification: The sentence has been changed according to the reviewer's comment.

b) The sentence beginning with "In accordance with popular belief" Should this read in accordance with previous research?

Justification: The sentence has been changed according to the reviewer's comment as we meant in accordance with previous research in our literature review.

c) ORs from other studies are not necessary in the discussion and could be removed.

Justification: The ORs have been reduced from the discussion section.

d) Page 11, second paragraph, should the opening sentence ". . . .violence are significant predictors of violence" read ". . . . violence are significant predictors for depression".

Justification: It was a error and the sentence has been changed according to the reviewer's comment.

e) Finally, I think it would round the discussion off nicely if the authors could suggest some useful public health initiatives that arise from their findings. For example, what sort of mental health initiatives or harm reduction campaigns would be useful? Would the provision of mental health care services for these women ameliorate some of the risks they take? Etc.

Justification: We have concluded the manuscript with the possible public health initiatives which can be feasible in Nepalese context. We have stated that we need to design our HIV prevention strategies in such a way that they address the distress and mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services and spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say "NO" to their clients. They should be made to realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and think about ways to address the issues of this population.

f) Table 2 and Table 3: This table would be easier to read without the no categories. Could the authors add a column and include the p values.

Justification: A column including P values has been introduced in all the tables. However, we have not removed the categories as we have tried to compare percentage distributions among the depressive and non-depressive category.

Reviewer: Allen Furr

Professor and Chair

Department of Sociology, Anthropology, and Social Work

Auburn University

USA

1.a.The introduction of the study should address the mental health of sex workers in general and Nepal in particular. As currently written, the introduction should include an argument as to why the research question is important and how it was derived or deduced. In short, the study requires a better defined justification, beyond saying there is no literature on mental health of sex workers. Although authors state in the intro that there is no literature on this subject, they provide a literature review in the concluding section of the paper.

Justification: Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio itself explains enormous need of mental health professionals to provide services to the general population. In this scenario, we can only imagine how difficult it is for an individual to be diagnosed and subsequently seek treatment for mental illness like depression which can be easily misdiagnosed as bad or low mood. In a nutshell, less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. The vast majority of research including bio-behavioural surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We have mentioned many studies related to the current topic but we could not mention a single study from Nepal. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

1.b. Also in the intro, the authors discuss three "dimensions" without specifying dimensions of any particular factor. In other words, what are these dimensions of?

Justification: These dimensions are not part of any one particular factor. There can be many more dimensions which increase vulnerability of female sex workers to accept atrocities which this profession has to offer. We have mentioned a few which were discussed in previous studies.

1.c. The design of the study appears exploratory; however, given that there are a number of studies that document that sex workers suffer more mental health problems (and one that doesn't, which the authors do not reference), the case needs to be made as to why sex workers in Nepal require special research attention.

Justification: Although, there are studies which state that women in sex trade can be more psychopathological compared to women in other profession we could not find researches and inquiries in Nepalese context. Our main interest was to investigate whether in our geographical context the scenario is similar or different.

2. Methods: (a) the terms in the sample size calculation must be specified;

Justification: A total of 210 FSWs were included in the study and this size was chosen on the basis of similar study which revealed prevalence of depression diagnosed through CES-D scale among sex workers to be 70%. By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

= (1.96*1.96 *70*30) / 7*7

= 164.64 …165 (approx.)

Thus, amplifying by 10% for possible non response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We interviewed 210 FSWs, 70 from each district.

(b) that 70% of Puerto Rican sex workers are depressed should be reported in the literature review section;

Justification: This has been changed according to reviewer's comment.

(c) what is the justification for the HIV variable? No reasons stated for its relevance in the introduction.

Justification: During our rapport building, we had realized that a lot of women wanted to quit the profession due to fear of contracting HIV/AIDS. This has been explained in the introduction with a thought that mental health could play an important role in involvement in risky behaviors. More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. Alternatively, when one is in the sex trade the fear of contracting HIV/AIDS is a serious concern. In spite of use of contraception, one cannot be 100 percent sure about being safe from HIV. Thus, we can only imagine the mental pressure and concern of FSWs regarding their well being during work.

3. The authors state that health research is limited to the study of customers of sex workers; however, there are many studies on the health of sex workers.

Justification: We wanted to focus that health research and various bio behavioral surveys in Nepal are concerned about overall health, HIV status and use of condoms among sex workers and their clients with very little emphasis on mental health of sex workers.

4. The questions on psychological abuse and violence should be stated.

Justification: All the questions of violence are now included in the methodology. The questions related to psychological violence are as follows:

a) Has anyone insulted you or made you feel bad about yourself?

b) Has anyone belittled or humiliated you in front of other people?

c) Has anyone done things to scare or intimidate you on purpose?

d) Has anyone threatened to hurt you or someone you care about?

5. The finding that having been insulted correlates with depression may be spurious because we cannot determine the severity or duration of the insulting behavior. If it occurred only once, I find it hard to believe that such an one-off incident can cause clinical depression.

Justification: During our conversations with respondents, psychological violence was very high and frequent too but our fault, we did not record the severity or duration of any form of violence. And this concern has been included as another limitation of our study.

6. On Page 10, the authors state "In accordance with the popular belief" women experiencing violence become more depressed. What is meant by "popular belief" is not clear.

Justification: We meant in accordance with our literature review of previous researches in the same topic and the sentence has been corrected.

7. On Page 11, the authors state that they cannot infer that sex workers become depressed before or after entering the trade. The Results Section, however, stated that HIV and violence are predictors of depression, which implies temporal order of events. The violence measured in the study is workplace violence, as stated on page 7, which further clouds the matter.

Justification: We have stated that a cross sectional study cannot infer predictors thus, we have stated that HIV risk behavior and violence were associated with depression among our study population during that particular time period. When we interviewed the sex workers, we included women who were involved in commercial sex activity in the past six months and also women who had experience any form of violence in past six months only at their workplace. Thus, throughout the manuscript violence refers to workplace violence in the past six months which has been clarified in the methods section.

8. If the researchers want to study HIV risk behavior in relation to depression, they should entertain the notion that depression may cause or at least precede the high-risk behavior.

Justification: In the introduction, where we have justified the need to study HIV variable we also have stressed upon the fact that risky behaviors can have an impact on the mental health of the sex workers and the possibility of depressed women being involved in high risk behavior. Then, again the temporality is a concern.

9. The authors conclude that several of the violence variables predict depression. However, there are no controls in the models that allow us to know how much of the variance in depression is due to those variables. For example, regarding the psychological abuse variables, 90% of those

women having been insulted score high on the depression measure. However, 73% of those not experiencing an insult also reported high depression scores. The depression rate seems high either way. For intimidation, 91% having experienced intimidation report depression; however, 80% of those not experiencing intimidation were also depressed. Controls are needed in the equations to determine if these variables are spurious. Other variables are similarly positioned.

Justification: We have realized that since it is a cross sectional study the sentence that violence and HIV risk behavior are predictors of depression is not appropriate. The temporal sequence cannot be predicted. Thus, we have changed it to associated factors of depression are violence and HIV risk behavior in the current study. However, this study might be a good basis to start new researches in the similar direction. Absence of controls which makes it difficult to understand the amount of variance due to the associated variables has been included as one of the limitations of the study.

10. There may be a typo in the "pushed or shoved" variable for "yes".

Justification: Yes, there was an error in typing which has been corrected.

STROBE STATEMEMENT

Item No	Recommendation	Main Document (page no.)
Title and abstract [1]	(a) Indicate the study's design with a commonly used term in the title or the abstract.	1
	(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction		
Background [2]	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives [3]	State specific objectives, including any pre specified hypotheses	4
Methods		
Study design [4]	Present key elements of study design early in the paper	4-5
Setting [5]	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	-
Participants [6]	Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables [7]	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	-
Data sources/ measurement [8]	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias [9]	Describe any efforts to address potential sources of bias	-
Study size [10]	Explain how the study size was arrived at	4-5
Quantitative variables [11]	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	-
Statistical methods [12]	(*a*) Describe all statistical methods, including those used to control for confounding	6
	(*b*) Describe any methods used to examine subgroups and interactions	-
	(*c*) Explain how missing data were addressed	6
	(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
	(*e*) Describe any sensitivity analyses	-
Results Participants [13]	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
	(b) Give reasons for non-participation at each stage	-
	(c) Consider use of a flow diagram	-
Descriptive data [14]	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
	(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data [15]	Report numbers of outcome events or summary measures	6
Main results [16]	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
	(*b*) Report category boundaries when continuous variables were categorized	-
	(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses [17]	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion		
Key results [18]	Summarise key results with reference to study objectives	7-8
Limitations [19]	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9

Interpretation [20]	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability [21]	Discuss the generalisability (external validity) of the study results	10
Other information		
Funding [22]	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10

BMJ open

Violence, HIV risk behavior and depression among female sex workers of Eastern Nepal.

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Secondary Subject Heading:	Public health, HIV/AIDS, Sexual health
Keywords:	EPIDEMIOLOGY, Depression & mood disorders < PSYCHIATRY, HIV & AIDS < INFECTIOUS DISEASES

TITLE

Violence, HIV risk behavior and depression among female sex workers of eastern Nepal.

Authors:

Sagtani, Reshu; Bhattarai, Sailesh; Adhikari, Baikuntha; Baral, Dharanidhar; Yadav, Deepak; Pokharel, Paras

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Keywords: EPIDEMIOLOGY, Depression & mood disorders < PSYCHIATRY, HIV & AIDS < INFECTIOUS DISEASES

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Reference Count: 23

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

ABSTRACT

Introduction

There is dearth of knowledge regarding mental health of Female Sex Workers (FSWs) in Nepal. The sex trade affects a person physically, psychologically and sexually, making them vulnerable to mental disorders including depression.

Objectives: The primary objective of the study was to estimate the prevalence of depression among FSWs of eastern Nepal. The secondary objective was to search for association between depression, violence and HIV risk behavior.

Design: Cross sectional/ Observational study.

Study Setting: This study was carried out in five cities of Eastern Nepal (Dharan, Itahari, Biratnagar, Damak and Birtamode). Both restaurant and street based FSWs were recruited in the study.

Participants: Females who had been involved in commercial sex activity in the past six months and gave informed consent were included in the study.

Primary outcome measure: A score of more than or equal to 16 on CES-D scale was considered as depression.

Methodology: Face to face interviews were done with the respondents who were sought through snowball sampling technique. Information regarding their depression status, HIV high risk behavior and violence was recorded. The estimated sample size was two hundred and ten.

Results:

We interviewed two hundred and ten FSWs (both restaurant and street based). The prevalence of depression among respondents was 82.4%. The FSWs who had experienced violence were five times more likely to be depressed than those were not victims of violence. The odds of depression was six times higher among respondents who were involved in any HIV risk behavior compared to those who were not involved.

Conclusion:

The present study reports high prevalence of depression, HIV risk behaviors and violence among FSWs of eastern Nepal. Mental health of the FSWs should also be regarded as an important aspect of HIV prevention efforts which can help to promote overall health of this population.

INTRODUCTION

Female Sex Workers (FSWs) represent a marginalized population that faces many occupational hazards.[1] They are at higher risk for violence, contracting sexually transmitted diseases, including HIV and stigmatization.[1-2] Number of studies have concluded that there are various domains which make sex workers a disadvantaged group which makes prostitution an multidimensional issue. [3-4] One of the dimensions is related to the legislative structure of the country in which they operate. In countries like Nepal where commercial sex is illegal, the criminalized status of their work means that commercial sex workers (CSWs) are prone to harassment and violence, are less empowered to negotiate safer sex, and are less likely to take legal actions against violence and abuse.[5] Another dimension relates to CSWs not seeking health care from public health services mainly because of their negative experiences in these settings such as being "refused service" and experiencing "public humiliation by health workers" or the location of public health facilities and the inconvenience of their hours of operation.[6-8] Poverty-driven phenomenon of 'survival sex' where CSWs accept "a client who refuses to use a condom" is also an important dimension.[9]

Poor mental health plays a significant role in involvement of an individual in high risk behaviors.[10] More specifically, depressed individuals can be involved in unprotected sex, substance abuse and erratic behaviors. [11] On the other hand, the fear of contracting HIV/AIDS could be a serious concern among commercial sex workers as effectiveness of condoms in preventing HIV and STIs has not been proven to be 100% till date. [12]

Presently, Nepal provides mental health services through 18 outpatient mental health facilities which treat about 300 per 100,000 general populations. This ratio highlights enormous need of mental health professionals to provide services to the general population. In this scenario, it can be difficult for an individual to be diagnosed and seek treatment for mental illness like depression which is often easily misdiagnosed for bad or low mood. [13]

Due to the world wide concern regarding spread of HIV/AIDS through this group, preventive measures are many of the times focused on risks associated with transmission of HIV/AIDS rather than on health questions in general or mental health consequences of sex work in particular.[14] As a result, the mental health needs of this population is generally ignored. The vast majority of research including bio-behavioral surveys in Nepal addresses the physical health, safety and highlight condom use among sex workers, but do not discuss their psychosocial needs and need for counseling services. Thus, this is one of the few studies in Nepal which shows interest in mental health especially among FSWs.

We designed this study to assess the present depressive status of FSWs and further explore its association with violence and HIV risk behavior which are commonly experienced by women in sex trade. Less number of health workers, ignorance regarding mental diseases and the stigma attached to prostitution made it important for us to go to the workplace of FSWs and inquire about depression. We believe that identifying depression and its associations will help in developing prevention strategies which may reduce HIV risk behavior, support behavior change and even improve health outcomes.

MATERIAL AND METHODS

An observational study was conducted in three districts of eastern Nepal. FSWs who had been involved in commercial sex activity in the past six months who gave informed consent were included. The sample size was derived from a similar study which revealed prevalence of depression diagnosed through CES-D scale among FSWs to be 70%.[11] By using the formula for sample size calculation:

$$\text{Sample Size } (n) = (1.96)^2 PQ/L^2$$

[P=prevalence of depression from reference study, Q= complement of P i.e. Q=100-p, L is precision/allowable error which is taken to be 10% of the P in this study]

$$= (1.96*1.96 *70*30) / 7*7$$

$$= 164.64 \ldots 165 \text{ (approx.)}$$

Thus, amplifying by 10% for possible non - response the final sample size is 165+16.5=171.5 or 172 i.e. at least 58 from each district. We planned to interview 210 FSWs, 70 from each district. The sex workers were contacted through snowball sampling, the first few respondents were traced with the help of NGO-Sahara Nepal which works for the cause of HIV prevention in the study area. Depressive symptomatology was recorded using Centre for Epidemiological Studies: Depression scale (CES-D) which is 20 item scale in which a cut-off point of 16 is considered appropriate to differentiate respondents with depression.[15-16] Questions regarding HIV risk behavior was adapted from Family Health International - HIV/AIDS/STD Behavioral Surveillance Surveys: for use with FSWs.[17] Positive history of a) syringe exchange; b) sex with intravenous drug user; c)sex under the influence of alcohol or drugs; d) oral sex; e) anal sex; f)Non-usage of

condoms during every sexual encounter; g) pregnancy after joining the sex trade was considered as being involved in HIV high risk behavior. Questions regarding work related violence adapted from questionnaire developed during WHO multi-country study on women's health and domestic violence against women. [18] The questions for recording psychological violence were:

a) Has anyone insulted you or made you feel bad about yourself?

b) Has anyone belittled or humiliated you in front of other people?

c) Has anyone done things to scare or intimidate you on purpose?

d) Has anyone threatened to hurt you or someone you care about?

The questions for recording physical violence were:

a) Has anyone pushed or shoved you?

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The questions for recording sexual violence were:

a) Have you ever been raped or sexually assaulted?

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A positive response to any one of the above eight questions was regarded as suffering from violence in the workplace. The women who had been suffered from any form of violence and

had been involved in HIV risk behavior in the past six months at their workplace (street/restaurant) after joining sex trade were included.

The questions were originally prepared in English and later translated into Nepali for collection of data according to standard translation guidelines. Completed questionnaires without any missing data were only included in the study as repeating of interviews would have been difficult due to high mobility of the study population.

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0 (SPSS Inc., Chicago IL). Odds Ratios were calculated to assess association of depression with variables of HIV high risk behavior and violence. Significant variables from bivariate analysis ($p < 0.05$) were then entered into binary logistic regression model with backward elimination. Ethical approval was taken from the institutional ethical review board, BPKIHS. Informed consent was taken from each respondent. Confidentiality and anonymity was assured and maintained.

RESULTS:

A total of 210 FSWs were interviewed of which, 173 respondents fell in the higher depressive category making the prevalence of depression among FSWs of eastern Nepal to be 82.4% . The FSWs who had been insulted were three times more likely to report depressive symptoms than those who had not (OR 3.28, 95%CI 1.50, 7.20) as shown in table 1. The respondents who were humiliated in front of others were twice likely to be having depression (OR 2.46, 95%CI 1.06, 5.70). The risk of depression was about seven times higher among the FSWs who gave a positive history of suffering from any form of violence (OR 6.96, 95% CI 3.21, 15.08).

Table 2 shows that the distribution of proportion for individual HIV high risk behaviors was not largely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). The risk of depression was three times higher in FSWs who had been involved in any one of the mentioned high risk behavior (OR 3.20, 95%CI 1.44, 7.11).

Logistic regression analyses revealed that women who had experienced any form of violence in the last six months had more than five times higher chance of being in depressive category than respondents who had not (AOR 5.89, 95% CI 2.22, 15.63) as shown in table 3. Similarly, FSWs who were involved in at least one mentioned HIV risk behavior were six times more likely to be in higher depressive category (AOR 6.03, 95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significantly associated with depression.

DISCUSSION:

In our study, the prevalence of depression among FSWs was 82.4%. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the sex workers had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[19] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill themselves.[20] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio

cultural characteristics. Comparable findings were seen in another study done by Alegria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[10] A Nigerian study concluded that in comparison with women of other occupational groups, FSWs were at greater risk of screening positive across many forms of psychopathology. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[14]

In accordance with the previous studies, the women experiencing violence were more likely to be depressed compared to those who did not in the current study too. An Indian study concluded that FSWs who experienced higher violence at work and at home had a higher measure of depression.[20] Harris M et al did a qualitative study to address the experiences of FSWs in urban Australia. They have been diagnosed with bi-polar disorder, and been mentally abused by a former partner. [21] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among FSWs (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts. [22]

In the current study, FSWs being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.09, 17.36). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms. Injected drug users were about seven times more likely than

those who did not inject drugs to reach high levels of depressive symptoms.[10] Hutton HE and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[11] In a study done in Australia, logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [23]

Our study concludes that there is a high prevalence of depression among the FSWs of Eastern Nepal. It also infers significant association of HIV risk behavior and violence with depression.

There are several limitations of the current cross sectional study. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded

which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services, spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say “NO” to their clients. We need to help them realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and they should implement ways to address the issues of this population.

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Competing interests: none declared.

Contributorship: Rsagtani was involved in conception and designing the study along with data collection and writing drafts.

S Bhattarai was involved in concept refining,developing questionnaire, writing drafts and critiquing them.

B adhikari helped in translation of questionnaire, diagnosis of depression, inputs in writing drafts.

DD Baral was instrumental in designing the study,statistical analysis and drafting the results.

DK Yadav was involved in critical analysis of the earlier drafts.

PKPokharel was responsible for concept refinement and critical analysis of the earlier drafts.

All the authors have read and approved the final version of the article for scientific publication.

Data sharing: No additional data available.

Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			

Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			
History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence	10.3	89.7	6.96	3.21, 15.08	***<0.001**
Yes	44.4	55.6			
No					

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% Cl	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923

No	15.5	84.5			
Condom usage during every sexual encounter					
Yes	20.3	79.7	0.77	0.36, 1.67	0.518
No	16.6	83.4			
History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.89	2.22	15.63
Involved in at least one risky behavior	.001	6.03	2.09	17.36

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from five different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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TITLE

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RESULTS:

A total of 210 FSWs were interviewed of which, 173 respondents fell in the higher depressive category making the prevalence of depression among FSWs of eastern Nepal to be 82.4% . The FSWs who had been insulted were three times more likely to report depressive symptoms than those who had not (OR 3.28, 95%CI 1.50, 7.20) as shown in table 1. The respondents who were humiliated in front of others were twice likely to be having depression (OR 2.46, 95%CI 1.06, 5.70). The risk of depression was about seven times higher among the FSWs who gave a positive history of suffering from any form of violence (OR 6.96, 95% CI 3.21, 15.08).

Table 2 shows that the distribution of proportion for individual HIV high risk behaviors was not largely different for depression. Among the 210 sex workers, no one gave a history of syringe exchange. However, the percentage of women who were involved in at least one mentioned behavior and depressed was high (85%). The risk of depression was three times higher in FSWs who had been involved in any one of the mentioned high risk behavior (OR 3.20, 95%CI 1.44, 7.11).

Logistic regression analyses revealed that women who had experienced any form of violence in the last six months had more than five times higher chance of being in depressive category than respondents who had not (AOR 5.89, 95% CI 2.22, 15.63) as shown in table 3. Similarly, FSWs who were involved in at least one mentioned HIV risk behavior were six times more likely to be in higher depressive category (AOR 6.03, 95% CI 2.09, 17.36). Thus, our study shows that violence and HIV risk behavior are significantly associated with depression.

DISCUSSION:

In our study, the prevalence of depression among FSWs was 82.4%. There is no national data with which we can compare our figure with. However, different studies done among sex workers reveal fluctuating figures. A study done in China revealed approximately 30 per cent of the sex workers had elevated depressive symptoms (with CESD score ≥16), 8 per cent had suicidal ideation, and 9 per cent had suicidal attempt.[19] An Indian study reported that majority of the sample (86 per cent) had depression more than 3 days a week and approximately 30 per cent of the sample reported that they tried to kill themselves.[20] This data is comparable with our data and also can be attributed to the fact that we have open borders and similar socio

cultural characteristics. Comparable findings were seen in another study done by Alegria M et al on 127 Puerto Rican sex workers in which 70 per cent of the sex workers fell into the high depressive category which was diagnosed through the same CES-D questionnaire.[10] A Nigerian study concluded that in comparison with women of other occupational groups, FSWs were at greater risk of screening positive across many forms of psychopathology. The prevalence ranged from 11.2 per cent (speech disorder) to 32.0 per cent (general psychopathology) among the sex workers, and from 3.2 per cent (sleep disorder) to 17.6 percent (general psychopathology) among the control group.[14]

In accordance with the previous studies, the women experiencing violence were more likely to be depressed compared to those who did not in the current study too. An Indian study concluded that FSWs who experienced higher violence at work and at home had a higher measure of depression.[20] Harris M et al did a qualitative study to address the experiences of FSWs in urban Australia. They have been diagnosed with bi-polar disorder, and been mentally abused by a former partner. [21] Similarly, a study was done to examine the association of sexual coercion with HIV-related risk behaviors and suicidal thoughts and attempts among FSWs (FSWs) in Guangxi, China. Multivariate logistic regression analyses indicate that sexual coercion was significantly associated with suicidal thoughts and suicide attempts. [22]

In the current study, FSWs being involved in HIV risk behavior were six times more likely to be depressed (95% CI 2.09, 17.36). Several studies have linked HIV high risk behavior with the mental status of a person. A study was done on 127 Puerto Rican sex workers which found out that sex workers who had unprotected intercourse with clients were more likely to report high rates of depressive symptoms. Injected drug users were about seven times more likely than

those who did not inject drugs to reach high levels of depressive symptoms.[10] Hutton HE and colleagues found depressed patients were more likely to have sex for money or drugs, to have had sex with an intravenous drug user, to have sex when "high" on alcohol or drugs, to have a greater number of lifetime sex partners, and to abuse alcohol or drugs than were non depressed patients.[11] In a study done in Australia, logistic regression analyses showed that a history of injecting drug use, an early age at leaving home and wanting to leave the sex industry were independent predictors of poor mental health. Distressed sex workers reported fewer sexual health examinations and less consistent condom use with their clients than those who were not distressed. [23]

Our study concludes that there is a high prevalence of depression among the FSWs of Eastern Nepal. It also infers significant association of HIV risk behavior and violence with depression.

There are several limitations of the current cross sectional study. To start with, due to the cross sectional study design the temporal association cannot be proved. We can neither say depression caused violence and HIV risk behavior nor can we state that presence of violence and indulgence in risky behavior made FSWs depressed. However, this study has provided us good basis to initiate future longitudinal studies to address the present concern of temporality. The odds ratios suggest that women who suffered from psychological violence were more likely to be depressed but the percentage distribution shows that proportion of women who did not suffer from psychological violence also had high depressive scores. Similarly, the women who were not involved in individual HIV risk factor also showed high depressive scores. This disables us to know how much of variance in depression is caused due to these variables. The information regarding frequency and severity of violence and risk behavior were not recorded

which is also an important limitation of the current study. Although, we tried to include FSWs of major cities of Eastern Nepal where prostitution is rampant, the hidden group, women working during few months, mobile FSWs might have been missed. Lack of detail history on substance abuse (possible confounder of depression) is another limitation of the study. The external validity of the study is questionable due to the hidden nature of the sampling frame.

In conclusion, we need to design our HIV prevention strategies in such a way that they address the mental health issues prevalent in this profession. The various agencies working with FSWs can start psycho social counseling services, spread knowledge regarding mental health importance and highlight taboos associated with it. Psychiatric evaluation of the FSWs can be coupled with their routine blood tests and clinical examinations at voluntary counseling and testing (VCT) centers. FSWs are scared of the law and thus, are less hesitant to practice their rights to say “NO” to their clients. We need to help them realize that their clients are also equally answerable to the law and nobody can make them do anything without their consent. Most importantly, there is a need to acknowledge the presence of an ever growing sex industry in Nepal by the policy makers and they should implement ways to address the issues of this population.

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Competing interests: none declared.

Table 1: Percentage distribution and Odds Ratio Estimates of work related violence by depression. (n=210)

Work related violence	Depression		Odds Ratio	95% CI	Sig value
	Absent (%)	Present (%)			
Insulted or made to feel bad					
Yes	9.6	90.4	3.28	1.50, 7.20	***0.001**
No	17.4	72.6			
Humiliated in front of others					
Yes	9.7	90.3	2.46	1.06, 5.70	***0.007**
No	23.9	76.1			
Intimidated on purpose					
Yes	9.4	90.6	2.25	0.82, 6.12	0.070
No	20.4	79.6			
Threatened to hurt loved ones					
Yes	17.9	82.1	0.98	0.34, 2.77	0.972
No	17.6	82.4			
Pushed or shoved					
Yes	21.4	78.6	0.75	0.28, 2.01	0.570
No	17.0	83.0			

History of physical assault					
Yes	15.2	84.8	1.23	0.44, 3.44	0.685
No	18.1	81.9			
Raped or sexually assaulted					
Yes	20.0	80.0	0.84	0.26, 2.67	0.760
No	17.4	82.6			
Attempt to rape					
Yes	17.6	82.4	0.99	0.43, 2.28	0.995
No	17.6	82.4			
Suffered from any form of violence	10.3	89.7	6.96	3.21, 15.08	***<0.001**
Yes	44.4	55.6			
No					

*statistically significant

Table 2: Percentage distribution and Odds Ratio Estimates of HIV high risk behavior by depression. (n=210)

HIV high risk behavior	Depression		Odds Ratio	95% CI	Sig. value
	Absent (%)	Present (%)			
Sexual intercourse under influence					
Yes	14.6	85.4	1.48	0.71, 3.06	0.439
No	20.2	79.8			
Sex with a intravenous drug user					
Yes	14.3	85.7	1.31	0.36, 4.72	0.673
No	18.0	82.0			
History of anal sex					
Yes	14.8	85.2	0.12	0.05, 0.31	0.060
No	12.9	87.1			
History of oral sex					
Yes	34.8	65.2	0.34	0.13, 0.88	0.923
No	15.5	84.5			
Condom usage during every sexual encounter	20.3	79.7	0.77	0.36, 1.67	0.518
Yes	16.6	83.4			
No					

History of pregnancy after joining sex trade					
Yes	12.4	87.6	1.94	0.90, 4.17	0.085
No	21.5	78.5			
Presence of any one HIV risk behavior					
Yes	14.0	86.0	3.20	1.44, 7.11	***0.020**
No	34.2	65.8			

***statistically significant**

Table 3: Association of violence and HIV risk behavior with depression - Logistic Regression

Significant Variables	Sig. value	Adjusted Odds ratio	95% Confidence interval	
			Lower	Upper
Experienced any one form of violence	<0.001	5.89	2.22	15.63
Involved in at least one risky behavior	.001	6.03	2.09	17.36

ARTICLE SUMMARY

Article focus:

- What is the prevalence of depression among FSWs of Eastern Nepal?
- Is there any association of depression with violence and HIV risk behavior which are prevalent in this profession?

Key messages:

- Depression is prevalent among the study population and thus, there is a need for future researches in the same direction to cater to mental health needs of FSWs.
- HIV prevention efforts should also be directed towards mental health issues to promote overall health among this group of vulnerable women.

Strengths and limitations of this study:

- This is one of the first attempts to understand mental health issues of this population in Nepal.
- We used standardized questionnaire which was translated and adapted according to local conditions for recording valid data and making comparisons with other studies.
- External validity of this study is a concern due to hidden nature of sampling frame.
- Temporal association of depression with violence and risk behavior could not be established due to cross sectional study design.
- The statistical power of this study is low which is evident from width of confidence intervals.

What this paper adds:

- This study highlights high prevalence of depression among female sex worker from five different locations.
- Psychological violence is more responsible for depression as compared to physical and sexual violence.
- A collection of high risk behaviors is strongly associated with depression and not just the most researched condom use and syringe exchange.

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STROBE STATEMEMENT

Item No	Recommendation	Main Document (page no.)
Title and abstract [1]	(a) Indicate the study's design with a commonly used term in the title or the abstract.	1
	(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction		
Background [2]	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives [3]	State specific objectives, including any pre specified hypotheses	4
Methods		
Study design [4]	Present key elements of study design early in the paper	4-5
Setting [5]	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	-
Participants [6]	Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables [7]	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	-
Data sources/ measurement [8]	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias [9]	Describe any efforts to address potential sources of bias	-
Study size [10]	Explain how the study size was arrived at	4-5
Quantitative variables [11]	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	-
Statistical methods [12]	(*a*) Describe all statistical methods, including those used to control for confounding	6
	(*b*) Describe any methods used to examine subgroups and interactions	-
	(*c*) Explain how missing data were addressed	6
	(*d*) If applicable, describe analytical methods taking account of sampling strategy	-
	(*e*) Describe any sensitivity analyses	-
Results Participants [13]	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
	(b) Give reasons for non-participation at each stage	-
	(c) Consider use of a flow diagram	-
Descriptive data [14]	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
	(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data [15]	Report numbers of outcome events or summary measures	6
Main results [16]	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
	(*b*) Report category boundaries when continuous variables were categorized	-
	(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses [17]	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion		
Key results [18]	Summarise key results with reference to study objectives	7-8
Limitations [19]	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9

Interpretation [20]	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability [21]	Discuss the generalisability (external validity) of the study results	10
Other information		
Funding [22]	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	10